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## (54) CURABLE COMPOSITION AND ITS USE

(57)Abstract:

PURPOSE: To obtain a curable compsn. which gives a cured item having a surface hardly attracting dust by compounding a specific org, polymer and a polymer of a polyfunctional hydrolyzable silane compd, as the essential components.

CONSTITUTION: This compsn. contains as the essential components an org. polymer having at least one reactive silyl group in the molecule and a polymer of a polyfunctional hydrolyzable silane compd. and is useful as a sealant and a coating agent. The org. polymer favorably is a deriv. of a polymer, such as of a polyether, a polyester, polyisobutyrene, polychloroprene, or polybutadiene, a deriv. of a polyether being more favorable and a polyoxypropylene compd. having a reactive silyl group at the molecular end being the most favorable. Pref. examples of the silane compd. are methyltrimethoxysilane and tetramethoxysilane.

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CLAIMS

[Claim 1] As organic polymer (A) which has at least one neetine ally groups in intrandendar, and a hardenability constituent which uses a polymer (B) of a polyfunctional hydrolytic silene compound as a reasonal functional hydrolytic silene compound as (Minn 2), eaching upent which consists of a hardenability constituent of claim 1. (Minn 3), coaler obtained by laving applied a hardenability constituent of claim 1. and under other obtained by laving applied a hardenability constituent of claim 1. In a substrate, and having applied a hardenability constituent of claim 1 to a substrate, and having applied a hardenability constituent of claim 1 to a substrate, and having applied a hardenability constituent of claim 1 to a substrate,

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

hardenability constituent which consist of a hardenability constituent in which performance with dust, Industrial Application This invention relates to the coating using the sealing agent and this etc. have been improved, and this hardenability constituent.

etc. using the hardening reaction of the organic polymer which has reactive sllyl groups at the end Description of the Prior Art Conventionally, tha method of using it for a sealing agent, adhesives,

which is known as modified silicone system resin is known well, and is a useful method industrially. The polymer which has such reactive silyl groups is proposed by JP.45-38319,B, JP.46-17553,B, JP,61-18582,B, etc., for example.

problem that dirt, such as dust, adhered to the surface especially easily, when it was used outdoors. agent and hardenability constituent which consist of a hardenability constituent which can reduce a reduction of the maintenance was SUBJECT. This invention provides the coating using the sealing [Problem(s) to be Solved by the invention]However, the above-mentioned sealing agent had the herefore, surface dirt had to be removed by operation of damping with a damp towel etc., and surface sex with dust, and this hardenability constituent.

reactive silyl groups in intramolecular, And it is a coating obtained by having applied to a substrate a Means for Solving the Problem]An organic polymer (A) in which this invention has at least one

[0005]"An organiolty polymar which contains at least one reactive silv! groups in intramolecular" (only henceforth "an organic polymer (A)") used in this invention, it is preferred that polyfunctional hydrolytic silane compound as an essential ingredient, and this hardenability sealing agent which consists of a hardenability constituent which uses a polymer (B) of a constituent, and thia hardenability constituent, and having stiffenad them.

polyiadobutylane system polymer a polychloroprene system polymer, and a polybutadiene eystem polymer, and it is indeferred that it is especially a ferhander of a spotyter system polymer. [D003] Powyters which contains at least one readfore ally groups in intramolecular (only hereeforth) they are derivatives, such as a polyether system polymer, a polyestar ayatam polymer, a

0007]Next, although a manufacturing method of polyether (P) is explained, an organic polymer (A) of this invention is not limited to polyether (P). As for polyether (P), it is preferred under existence of a catalyst that it is a derivative of polyoxyalkylene which made alkylene oxide, such as propylene oxide, polyether (P)") is proposed by JP.3-47825,A, JP.3-72527,A, JP.3-43449,A, JP.3-79627,A, etc., for cthylene oxide, and butylene oxide, react to initiators, such as a hydroxy compound which has at

gyanide complex catalyst, atc. are mentioned. By using a composite metal cyanide complex catalyst, [0008]As a catalyst, an alkaline metal catalyst, a porphyrin complex catalyst, a composite metal a value of M./M., is lower than a polyoxyalkylene polymer manufactured using the conventional least one hydroxyl group, and was manufactured.

Ilkaline metal oatalyst, and since a polyoxyalkylene polymer of hypoviscosity is obtained more in the

mount of polymers, it is more desirable.

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10009]As a composite metal ayanide complex, a thing of a statement can be used for JP,46-27250,B. 4 complex which uses zinchexacyano cobaltate as the main ingredients especially is preferred, and dimethyl ether (glyma), diethylene glycol dimethyl ether (jig lime), etc. are preferred, and glyme is preferred especially from an ease of handling at the time of complex manufacture. As alcohol, tthe ether and/or especially an alcoholic complex are preferred. Here, as ether, ethyleneglycol outanol given in JP 4-145123,A is preferred.

compound, a polyoxy butylene compound, polyoxy hexylene compounds, and/or these copolymers are [0010]As for a functional group number of a polyoxyalkylene polymer, two or more are preferred, and especially 2-4 are preferred. Specifically, a polyoxyethylene compound, a polyoxypropylene

[0012]Like a silicon content group which has the hydrolytic basis coupled directly with a silanol group or a silicon atom, reactive silyl groups cause a condensation reaction with hygroscopic surface or a silicon moisture, a hardoning agent, etc., can promote polymers quantification of polyether, and are shown by preferably. When using for a method of the following (b) or (\*\*), a polyoxyalkylene polymer of olefin [0011]They are polyoxypropylene diol, polyoxypropylene triol, and polyoxypropylene tetraol most ands, such as an allyl end polyoxypropylene monooar, is also preferred.

Howavar, a hydrolytic basis and a of R3 are 1, 2, or 3 among a formula (1) substitution of the carbon numbers 1-20 or an unsubstituted univalent hydrocarbon group, and X. [0013]- SiX, R3 3-3 ... (1)

[0014]R<sup>2</sup> in a formula (1) has a with a carbon number of eight or less alkyl group, a phenyl group, or a illustrated. Among these, as for a carbon number of a hydrolytic basis which has a carbon atom, six or amide group, an amino group, an aminooxy group, a KETOKISHI mate group, and a hydride group are preferred fluoro alkyl group, and a mathyl group, an ethyl group, a propyl group, a propenyl group, a 0015]As X in a formula (1), a hydroxyl group, a halogen atom, an alkoxy group, an acyloxy group, an less are preferred, and four especially or less are preferred. Desirable bases are a with a carbon butyl group, a hexyl group, a cyclohexyl group, especially a phenyl group, etc. are preferred.

number of four or less lower alkoxy group especially a methoxy group and an ethoxy basis, a propoxy '0016]As for a in a formula (1), it is preferred that it is especially 2 or 3. group, a propenyloxy group, etc.

hardened material holds pliability and uses for a sealing agent, adhesives, etc. also at low temparature polymer which has a functional group, and is manufactured is preferred so that it may state to the following (b), (\*\*), (\*\*), and (\*\*). Such a compound is liquefied at a room temperature, and when a comparatively, it is provided with the desirable charecteristic. [IDIDIS[48] expressively to provided with the sam [IDIDIS[48] An analysis of which has an element already and strength to which a laine compound alread when the polycoxylatycles of provident which has an element of the strength and the properties of the strength the properties of the strength of the '0017]As for polyether (P), what introduces reactive silyl groups into an end of a polyoxyalkylene

0019]HSiX\_R3 -4 ... (2) such as Pt.

R3, X, and a are the same as the above among a formula (2).

hydroxyl group which introduce an olefin group into a side chain, cto. are mentioned by adding and compound which has an olefin group and a functional group is made to react to terminal hydroxyl carrying out copolymerization of the olefin group content epoxy compounds, such as allyl glycidyl groups of a polyoxyalkylene polymer. When polymerizing a method or alkylene oxide combined by ether bond, ester bond, a urethane bond, carbonate combination, etc., A method of polymerizing alkylene oxide by using as an initiator a compound which has a method or an olefin group, and a [0020]As a method of obtaining a polyoxyalkylene polymer which has an olefin group here, A

[0021](\*\*) How to make a compound shown by a formula (3) react to an end of a polyoxyalkylene polymer which has a hydroxyl group.

R3 3- SIX -R\*-NCO .. (3)

the inside of a formula (3), R3, X, and a — the above — the same — R4 — a divalent hydrocarbon

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[0023]A compound of \*\* 1 can be shown as a compound shown by a formula (3). group of the carbon numbers 1-17.

Formula 13(C<sub>2</sub>H<sub>3</sub>O) 3Si(CH<sub>2</sub>) 3NCO. (cH<sub>3</sub>O)3Si(CH<sub>2</sub>) 3NCO. (CH<sub>3</sub>O) 2(CH<sub>3</sub>O) Si(CH<sub>2</sub>O) 3NCO. (cH<sub>3</sub>O)

react to the end of the polyoxyalkylene polymer which has a hydroxyl group and considering it as en formula (4) is made to react after making polyisocyanate compounds, such as tolylene diisocyanate, 00251(\*\*) A method to which W basis of the silane compound shown in this isocyanate group by e SINCO, (CH., 0) 2SI(NCO) 2.

0026]R3 3-4-SiX -R4-W .- (4)

socyanate group end.

(0027](\*\*) A method to which an olefin group of a polyoxyalkylene polymer which has the olefin group R<sup>3</sup>, R<sup>4</sup>, X, and a are the same as the above among a formula (4). An active hydrogen containing group ss which W was chosen from a hydroxyl group, a carboxyl group, a sulfhydryl group, and an amino obtained by a method described above, and a sulfhydryl group of a slane compound shown by a formula (4) whose W is a sulfhydryl group ere made to react. group (the 1st class or the 2nd class).

0028]As for the number of reactive silyl groups, it is preferred that it is 1.0 or more par molecule in 0029]Polymer distribution polyether which a polymer of a polymerization natura unaaturetion group a total molecule average.

,0030]As an organic polymer (A) in this invention, the number average molecular weights 1000-50000, high, and practicality becomes low. As for especially a number average molecular weight, 8000-30000 average molecular weight of an organic polymer (A) is lower than 1000, pliability and elongation of a hardened material are setisfactory, but viscosity of the polymer itself [ this ] becomes remarkably especially an organic polymer of 5000-30000 are preferred. If elongation will become low and a number average molecular weight exceeds 50000 firmly [ a hardened material ] when a number content monomer distributes may be sufficient as polyather (P).

are preferred.

Joseph Landon Hydrolytic silane compound is a compound which has the basis which 2-4 indevolve behavior coupled from the management of the properties coupled devolve with one siland natural yearwhite (19) of a polymer (10) and yearwhite this compound according to

llustrated. It is an alkoxy group preferably and, as for especially tha four or less carbon numbers, 1-2 0032]As a hydrotytic basis, an alkoxy group, an elkoxy alkoxy group, an acyloxy group, an aryloxy group, aminoxy, an amide group, a katoxima group, an isocyanate group, a halogen atom, etc. ere piaces are preferred.

[0033]Functional group numbars of e polyfunctional hydrolytic silane compound are 2-4, and especially 3-4 are preferred. As an example of a desirable polyfunctional hydrolytic silane compound, silane compounds, such as a methyl trimethoxy run, a tetramethoxy silane, ethyltrimethoxysilane, a the mixture in which what has a letter of branching, annular, and network structure in a thing with a shape, a letter of branching, annular, and network structure in a polymer, and it is thought that it is contained. A polymer (B) used by this invention may be used as a mixture of what may use a thing output in a hardenability constituent. Here, the degree of many quantification means condensation 0035]A polymer of tetre alkoxysilane is mentioned as a desirable polymer (B). It is expressed with [0034]A polymer (B) is a thing of the degree of many quantification which does not generate gel molecularity of a polyfunctional hydrolytic silane compound. There is a thing with straight chain thing which usually has straight-chain-shape structure, or straight-chain-shape structure is etraethoxysilane, vinyltrimetoxysilane, and phenyltriethoxysilane, are mentioned. with such structures alone, respectively, or has such structures.

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(0036)n expresses the degree of many quantification of a polymer smong e general formula. Usually, a

general formula RO(Si (OR) 20) R if this is shown as a thing with straight-chain-shape structure.

polymer which can be obtained is a mixture of a polymer in which in differs, and the dagree of many examiliation is expressed with overgaden. Desirable in is 2-10 and espacially 2-8 are preferred since the becomes become large too much and difficult to propare the viscosity a hardentiality.

JP,08-127724,A [DETAILED DESCRIPTION]

constituent, a large thing does not have preferred n.

of a tetramethoxy silane or R whose R is a methyl group is an ethyl group from fields, such as the hydrolysia nature of an alkoxy group and condensation neture, is preferred. Two or more R may differ butyl group, are illustrated among a general formula. A polymer of a tetraethoxysilane whose polymer [0038]As a commercial polymer (B), Mitsubishi Chemical 51 [ MKC silicate MS], MS56, MSEP2, the [0037]As R, low-grade alkyl groups, such as e methyl group, an ethyl group, a propyl group, end a in one molecule.

col coat methylsilicate 51, the ethyl silicate 40 and 40T, 48, N103X, HAS-10, Matsumoto Trading Olge compound at a polymer (B), organic acid, such as factic acid and chloride, and inorganic acid can also [0040] In order to make a hardenability constituent of this invention promote hardening by humidity, a dilsurate, and dibutyl amine 2-ethylhoxenoate, other acid catalysts, and a basic catalyst can be used oxide, a zinc oxide, an active white, hydrogenation castor oil, and glass balloons, esbestos, glass fiber Chicks SI series, the ethyl silicate 40 made from the Tama chemicals, and 45 grades are mentioned. hardening accelerator catalyst which promotes a hardening reaction of reactive silyl groups may be '0042]If still more nearly required for a hardenability constituent of this invention, a bulking agent, a used for it. As a herdening ecoclorator catalyst, an alkyl titanate, an organic silicon titanate, Amine carbonate, diatomite, calcination clay, clay, tale, titanium oxide, bentonite, organic bentonite, ferric be added to a polyfunctional hydrolytic silane compound. Therefore, a polymer (B) may contain a plasticizer, etc. may be contained. As a bulking agent, can use a publicly known bulking agent, and specifically, Fumes silice, sedimentation nature silica, a silicic acid anhydride, hydrous silicic acids. 0041]A dehydrator may be added in order to improve storage stability further to a hardanability constituent of this invantion. As a dehydrator, hydrolytic organicity silicone compounds, such as ORUTOGI acid alkyls, vinytrimetoxysilane, and a tetraethoxysilane, a hydrolytic organic titenium [0039]In order to make high the degree of condensation of a polyfunctional hydrolytic silane salt, such as cerboxylets, such as bismuth tris-2-ethylhexanoate, tin octylate, and dibutyltin and a bulking egent like carbon black, Fibrous fillers, such as bulking agents, such as calcium compound, etc. can be used. small emount of such ecid.

ester, such as glycol ester, such as pentaerythritol ester. and tricresyl phosphate, epoxidized soybean 0043]As e plasticizer, can use a publicly known plasticizer and specifically Dioctyl phthalate, Phthelic ester, such as phthalic acid benzyl butyl ester, adipic acid octyl. Aliphatic-carboxylic-acid ester, such as succinic acid isodecyl, dibutyl sebacata, and butyl cleate, Epoxy plasticizers, such as phosphoric oil, and epoxy stearlo acid benzyl, a chlorinated paraffin, etc. can be independent, or can use it with and a filement, can be used.

mercaptosilane, and an epoxy rasin, paints, various antiaging egents, an ultraviolet ray absorbent, etc [0044]A hardenability constituent of this invention may contain still more publicly known various sdditive agents etc. As en additive agent, adhesive grant sgante, such es epoxysilsne, an two or more sorts of mixtures. can be used. [0045] By containing a polymer (B), hydrophilic nature of a hardenability constituent of this invention is improving, therefore compatibility of the surface of a hardened material which this hardenability becomes uniform, it can be begun by rain to pour dust, end it is thought that a sex with dust is constituent hardens with rain is improving. Therefore, when it rains, a flow side of surface rain

constituent again. Since a hardenability constituent of this invention is hardened under hygroscopicsurface-moisture existence et a room temperature and serves as a rubber elastomer, it is preferred advantage that the hardened material surface which this constituent hardens has a high effect of [0046]This invention is a sealing agent which consists of the above-mentioned hardenability to use it especially as an elastic scaling agent. When it is used as a scaling agent, it has the mitigation of a sex with dust, and antifouling property is high.

constituent to a substrate, and having stiffened it again. Since a coating obtained by having appliad a hardenability constituent of this invantion to a substrate, and having stiffened it has a high effect of (0047) This invention is a coating obtained by having applied the above-mentioned herdenability mitigation of e sax with dust and its antifouling property is high, it can sim at reduction of a meintenance. Therefore, antifouling property of e substrate can be planned by covering e nttp://www4.ipdl.inpit.go.jp/cgi-bin/tran\_web\_cgi\_ejje?atw\_u=http%3A%2F%2Fwww4.ipdli.. 2010/03/03

etc. which harden sealing agents other than a metal plate, a board made of a synthetic resin, a sheet, antifouling property is needed, and considering it as a coating. As a substrate, a hardened material nardenability constituant of this invention on the surface of a substrate for which especially and a hardenability constituent of this invention are mentioned.

Example Hereafter, although an example (Examples 1-5, Examples 8-11) and a comparative example Examples 6-7, Examples 12-13) explain this invention concretely, this invention is not limited to

[0049][Example 1 of manufacture] Propylene oxide was polymerized with the zinchexacyano

obtained. Isocyanate propylmethyl dimethoxysilane was added to this, the urethane-ized reaction was the organic polymer (P1) which has an average of 1.2 reactive silyl groups per molecule was obtained. performed, the hydroxyl group of both ends was changed into the methyl dimethoxy silyl group, and weight 1000 as the initiator, and polyoxypropylene diol of the average molecular weight 10000 was cobaltate catalyst by having used the diethylene glycol propylene oxide addition of the molecular

obtained. After adding the methanol solution of sodium methylate to this and removing methanol, the cobaltate catalyst by having used the diethylene glycol propylene oxide addition of the molecular weight 1000 as the initiator, and polyoxypropylene diol of the average molecular weight 17000 was Furthermore, the addition reaction of the methyl directhoxysilane was cerried out by having made chloroplatinic acid into the cstalyst, and the organio polymer (P2) which has an average of 1.6 0050][Example 2 of manufacture] Propylene oxide was polymerized with the zinchexacyano ally! chloride was added and terminal hydroxyl groups was changed into the allyloxy group.

reactive silyl groups per molecule was obtained.

as the initiator, and polyoxypropylene triol of the average molecular weight 15000 was obtained. After cobaltate catalyst by having used the glycerin propylene oxide addition of the molecular weight 1000 nto the catalyst, and the organic polymer (P3) which has an average of 1.8 reactive silyl groups per adding the methanol solution of sodium methylate to this and removing methanol, the allyl chloride addition reaction of the methyl dimethoxysilane was carried out by having made chloroplatinic acid was added and terminal hydroxyl groups was changed into the allyloxy group. Furthermore, the [0051][Example 3 of manufacture] Propylene oxide was polymerized with the zinchexacyano nolecule was obtained.

[0055][Examples 1-7] As opposed to 100 copies (it is [ a weight section and the following ] the same 0054][Example 6 of manufacture] The tetramethoxy silane was hydrolyzed and the silane compound B-2) of the average molecular weight 390 which is a polymer of a tetramethoxy silane was obtained. copies of titanium oxide. Three copies of hydrogenation castor oil, three copies of vinytrimetoxysilane, one copy of phenolic antioxidant. The silane compound B1 or B-2 shown in two of the organic polymers P1-P4, 50 copies of dioctyl phthalate, 120 copies of calcium carbonate, ten 0052][Example 4 of manufacture] After mixing powder caustic alkali of sodium to polyoxypropylene 0053][Example 5 of manufacture] The tetraethoxysilane was hydrolyzed and the silane compound diol of the average molecular weight 4000, made it react to bromochloromethane, it was made to urthermore, the addition reaction of the methyl dimethoxysilane was carried out by having made B1) of the average molecular weight 744 which is a polymer of a tetraethoxysilane was obtained. react to an allyl chloride further, and terminal hydroxyl groups was used as the allyloxy group. chloroplatinic acid into the catalyst, and the organic polymer (P4) was obtained. The average molecular weight of polyoxypropylena diol convarsion of this organic polymer was 11000.

good rubber elastomer. The result of having evaluated the surface contamination nature threa nonths after exposing a presentation and hardened material of each hardensbility constituent to the (0056)The silane compound B1 - B-2 were not blended, and also the hardenability constituent was nardenability constituent which added five copies of tetraethoxysilanes (silane compound (B3)) was 0057]By exposing to humidity, these constituents started hardening promptly and changed to the obtained similarly (Example 6). Furthermore instead of the silane compound B1 - B-2, the

copies of aminosilanes and a table was kneaded as five copies and a curing catalyst for silicon resin

inder the conditions into which hygroscopic surface moisture does not go two copies of dibutyltin

diaurate, and the hardenability constituent was obtained (Examples 1-5).

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JP,08-127724,A [DETAILED DESCRIPTION]

outdoors is shown in Table 1. Evaluation of surface contamination nature made O fitness, and made x

Examples 12–13 look at the surface contamination nature of substrate I and RO which is not covered [0058][Examples 8-13] When the hardenability constituent obtained in Example 2 and Example 4 was with a hardenability constituent for comparison. Substrate I shows an aluminum plate and substrate RO shows a poly chloridation vinyl sheet. Evaluation of surface contamination nature is the same as pasted up on the base material surface. The result of having evaluated the surface contamination numidity, hardening was started promptly and the hardened material obtained the coating firmly applied to the substrate shown in Table 2 by a thickness of 2 mm and having been exposed to nature three months after exposing this coating to the outdoors further is shown in Table 2.

that of the above.

7	21 EN X
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ı,	0 20 0
4	4 t O
es	8 1 O
63	P 2 B 1
	P1 B1 O
25	金額 かかい代布物 対国形容器

Table 2

	THE STATE
8	5 40
6	2 II O
1.0	<b>2</b> 4 4 0
1.1	<b>₹</b> □ O
1.2	I / X

having applied to the substrata the hardened material and hardenability constituent of this invention Effact of the Invention] Preventable contamination nature of the surface of the coating obtained by which harden a hardenability constituent, and having atiffened them is improving extremely.

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